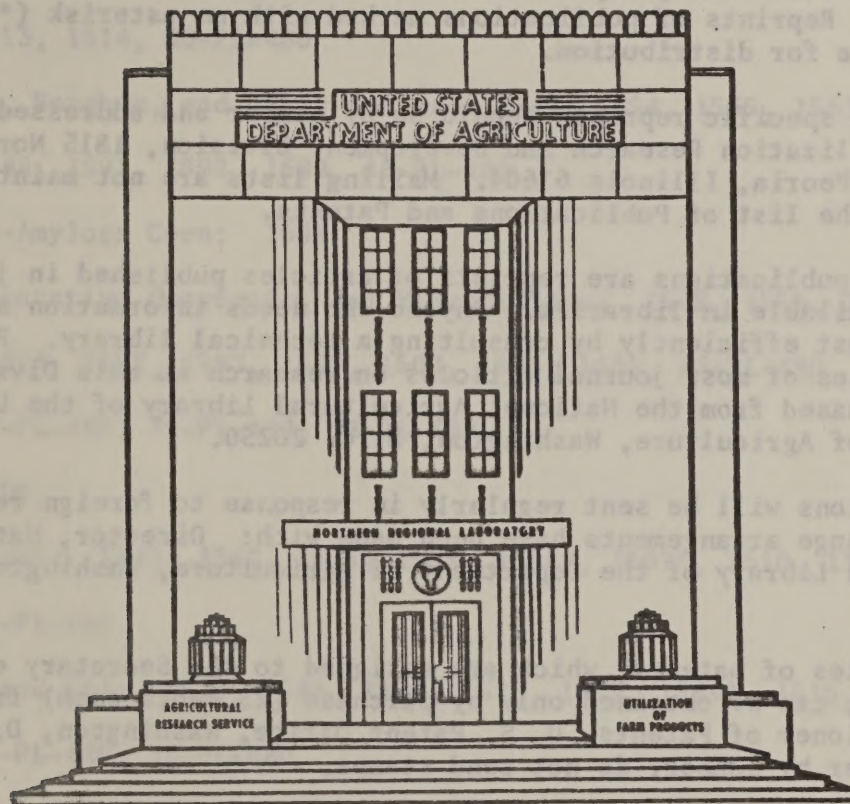


January 1964

PUBLICATIONS AND PATENTS
of the
NORTHERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION
Peoria, Illinois, for the period
July - December 1963



Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Congress in 1938 authorized four regional laboratories to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. Agricultural products assigned the Northern Division are: The cereal grains--corn, wheat, barley, grain sorghum, and oats; the oilseeds--soybean, flaxseed, safflower, and erucic acid-containing oilseeds; and new crops. The abstracts in this list describe current research on these commodities and indicate progress achieved by the Northern Division.

Northern Division publications are available, in conformance with the policy of the Department of Agriculture, to scientists and other specialists, librarians, representatives of the press, and others interested. Reprints of publications marked with an asterisk (*) are not available for distribution.

Requests for specific reprints should be by number and addressed to: Northern Utilization Research and Development Division, 1815 North University, Peoria, Illinois 61604. Mailing lists are not maintained except for the list of Publications and Patents.

Most of the publications are reprints of articles published in journals that are available in libraries. Anyone who needs information may obtain it most efficiently by consulting a technical library. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U. S. Department of Agriculture, Washington, D. C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with: Director, National Agricultural Library of the Department of Agriculture, Washington, D. C. 20250.

Printed copies of patents, which are assigned to the Secretary of Agriculture, can be obtained only by purchase (25 cents each) from the Commissioner of Patents, U. S. Patent Office, Washington, D. C. 20231. Order by number, do not send stamps.

Copies of previous lists of publications and patents are available on request.

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1540 WET-MILLING PROPERTIES OF GRAINS: BENCH-SCALE STUDY.

Roy A. Anderson.

Cereal Sci. Today 8(6): 190-192, 195, 221. July 1963.

The bench-scale procedure described for studying wet-milling characteristics of cereal grains is reasonably reproducible. Results from this procedure may be readily compared to those from industrial processing.

1541 MULTIPLE HYDROGENATION INSERT.

R. A. Eisenhauer and R. E. Beal.

Anal. Chem. 35(8): 1110. July 1963.

When a few samples need to be hydrogenated on a semimicroscale, a stainless-steel insert, which has a capacity of 10 ml., is available for use with a commercial 300-ml. reaction vessel, otherwise too large for small amounts. However, when many samples must be hydrogenated for analytical purposes, time becomes an important factor because only 1 sample can be hydrogenated at a time with the 10-ml. insert and because only a few can be done in an 8-hour day. Methods for hydrogenating several samples simultaneously were explored, and a new insert was designed that allows the hydrogenation of 6 samples concurrently.

1543 DIMETHYL MALEATE ADDUCTS OF VEGETABLE OILS AS PLASTICIZERS FOR NITRILE RUBBERS.

W. R. Miller, E. W. Bell, and H. M. Teeter.

Rubber Age 93(4): 575-578. July 1963.

Prepared by a simple one-step process, Diels-Alder adducts of dimethyl maleate with soybean, safflower, and linseed oils are excellent partially extractable plasticizers for nitrile rubbers. These adducts resemble polymeric plasticizers in low-temperature properties, volatility, and oil extraction. Sulfur dioxide was the catalyst used in forming the adducts by direct reaction of dimethyl maleate with oil.

1544 POLYMERIZATION STUDIES WITH ALLYL STARCH.

C. A. Wilham, T. A. McGuire, A. S. Rudolphi, and C. L. Mehlretter.

J. Appl. Polymer Sci. 7(4): 1403-1410. July 1963.

Some years ago allyl starch commanded considerable interest for use as a protective coating. At that time certain properties associated with the product limited its practical utility. Possible modifications of allyl starch by polymerization with new unsaturated monomers has renewed interest in its potentialities. Variations in the degree of

homopolymerization of allyl groups of starch and starch products were made to attain improved coating characteristics. Details are presented on the extent and type of polymerization obtained by free radical reaction of allyl starch and unsaturated monomers, such as acrylamide, acrylonitrile, and maleic anhydride.

- 1545 IONIC EFFECTS ON THE PHOTOCHEMICAL ACTIVITY OF BACTERIAL CHROMATOPHORES.
J. W. Newton.
Proc. Natl. Acad. Sci. U.S. 49(6): 866-870. June 1963.

Study of induction periods in electron transfer reactions of bacterial chromatophores indicates the existence of light-induced conformational changes in the particles. The dominant forces involved in the process appear to be hydrophobic interactions among chromatophore components.

- 1546 THREE NEW OILSEEDS RICH IN CIS-11-EICOSENOIC ACID.
K. L. Mikolajczak, C. R. Smith, Jr., and I. A. Wolff.
J. Am. Oil Chemists' Soc. 40(7): 294-295. July 1963.

Marshallia caespitosa Nutt. seed oil (family Compositae) contains 44% cis-11-eicosenoic acid, and is the first oil from the Compositae found to contain a high proportion of C₂₀-monoenoic acid. Seed oils of Alyssum maritimum (L.) Lam. and of Selenia grandis Martin (family Cruciferae) contain 42 and 58% of the same acid, respectively.

The C₂₀ acids from all three oils were obtained in nearly pure form by fractional distillation of the mixed methyl esters by means of a spinning band column. Permanganate-periodate oxidation of the purified methyl esters yielded predominantly nonanoic and undecanedioic acids.

- 1547 IDENTIFICATION OF PEAKS IN GAS-LIQUID CHROMATOGRAPHY.
T. K. Miwa.
J. Am. Oil Chemists' Soc. 40(7): 309-313. July 1963.

Some of the known principles of gas-liquid chromatography are reviewed. Application of the equivalent chain length (ECL) method to identification of complex molecules, and to prediction of structures of unknowns, is described in detail.

- 1548 DETERMINATION OF CYCLIC FATTY ACIDS BY GAS-LIQUID CHROMATOGRAPHY.
L. T. Black and R. A. Eisenhauer.
J. Am. Oil Chemists' Soc. 40(7): 272-274. July 1963.

A method is described to determine cyclic fatty acids in cyclic monomers by gas-liquid chromatography (GLC), which separates saturated straight-chain esters from cyclic esters. The content of cyclic esters can be determined by integration of the area on the chromatograph under the cyclic peaks. GLC was applied to cyclic monomers made from linseed oil and from linolenic acid. Samples of both hydrogenated and nonhydrogenated cyclic monomers were analyzed; however, more reliable results were obtained on the hydrogenated samples. The results show a standard deviation of 0.25 for linseed oil and 0.36 for linolenic acid.

Accuracy of the analysis was established by comparing data with that obtained by crystallization. The GLC method is approximately three times faster.

- 1549 COMPOSITION OF METHYL ESTERS FROM HEAT-BODIED LINSEED OILS.
L. E. Gast, Wilma J. Schneider, C. A. Forest, and J. C. Cowan.
J. Am. Oil Chemists' Soc. 40(7): 287-289. July 1963.

Two heat-bodied linseed oils, with Gardner viscosities of 37 and 55 minutes, were saponified, converted to their methyl esters, and separated into 2 fractions with urea and methanol. Gas-liquid chromatography showed the adduct fraction, which comprised 38-41% of the total methyl esters, to contain: palmitic, stearic, oleic, linoleic, and trace amounts of linolenic acid. The nonadducting fraction (59-62%) of the total methyl esters was separated by molecular distillation at 140°C./7 microns into a distillate and residue. The distillate amounted to 18-25% of the total methyl esters and had an iodine value of 142-145; its absorption at 232 m μ indicates 2.5-3.0% conjugated diene. Hydrogenation of this distillate gave a liquid product with an iodine number of 4 and a pour point of -50°C. Gas chromatograms of the distillate and its hydrogenated derivative indicated at least 5-7 components. Comparison of these peaks with known fatty acid methyl esters indicated that the components of these fractions were either cyclic or branched esters. The nonadducting residue fraction was composed mainly of polymeric acids.

- 1550 NUCLEAR MAGNETIC RESONANCE FOR DETERMINING OIL CONTENT OF SEEDS.
T. F. Conway¹ and F. R. Earle. (¹Corn Products Co., Argo, Ill.)
J. Am. Oil Chemists' Soc. 40(7): 265-268. July 1963.

Twelve seed oils containing a variety of functional groups were examined with a commercial broad-band nuclear magnetic resonance (NMR) instrument. Instrument response was directly related to hydrogen content of the oil ($r = 0.999$) regardless of the structures present.

NMR techniques were applied to the determination of oil in intact, partially dried seeds from 18 plant species containing 1.5-53% oil having a variety of structures. The correlation between integrator readout (calculated to a uniform 25-gram sample weight) and oil content (determined by extraction with petroleum ether) is excellent ($r = 0.993$). If the readout is further modified by a correction for the variation in hydrogen content of the oils, the correlation becomes 0.996.

- 1551 HYDROGENATION OF LINOLENATE. VIII. EFFECTS OF CATALYST CONCENTRATION AND OF TEMPERATURE ON RATE, SELECTIVITY, AND TRANS FORMATION.
A. E. Johnston, Helen M. Ven Horst, J. C. Cowan, and H. J. Dutton.
J. Am. Oil Chemists' Soc. 40(7): 285-286. July 1963.

The effects of catalyst concentration and of temperature on linolenate selectivity, trans formation, and rate of hydrogenation have been studied for a commercial electrolytic nickel catalyst. Results obtained with an equimixture of linoleate and linolenate (following the procedure described in Part VI of this series) are presented as isometric drawings, which cover the experimentally practical ranges of 70°-230°C. and of nickel concentration from 0.05-10%. Whereas the rate of hydrogenation strongly depends upon both temperature and catalyst concentration, trans formation is essentially a function of temperature while selectivity is little influenced by either parameter.

1552 THE NEUROACTIVE FACTOR ALPHA-GAMMA DIAMINOBTYRIC ACID IN ANGIOSPERMOUS SEEDS.

C. H. VanEtten and Roger W. Miller.

Econ. Botany 17(2): 107-109. April/June 1963.

Seeds from 158 species of 39 plant families were examined for α - γ -diaminobutyric acid, which has been isolated from seed of Lathyrus sylvestris and L. latifolius by other investigators. The presence of the compound in large amounts in L. sylvestris was confirmed. Possible trace amounts ranging from 0.03-0.29% of the total nitrogen were found in six other Lathyrus species and from six species of related genera. Trace amounts ranging from 0.01-0.07% of the total nitrogen were found in 18 additional species, and none of the compound was found in the remaining 65. Evidence for the presence of the neuroactive substance was based on an elution peak occurring in the same position as that of an authentic sample.

1553 FRACTIONATION OF WHEAT GLUTEN BY GEL FILTRATION.

R. W. Jones, G. E. Babcock, N. W. Taylor, and R. J. Dimler.

Cereal Chem. 40(4): 409-414. July 1963.

Wheat gluten was fractionated into glutenin and gliadin on columns packed with a special crosslinked commercial dextran. The glutenin was essentially electrophoretically pure, but the gliadin was contaminated with traces of glutenin. Gliadin components moved at slightly different rates, but resolution was not sufficient to yield separate components.

1554 CAROTENOIDS OF CORN AND SORGHUM. III. VARIATION IN XANTHOPHYLLS AND CAROTENES IN HYBRID, INBRED, AND EXOTIC CORN LINES.

C. W. Blessin, J. D. Brecher, R. J. Dimler, C. O. Grogan,¹ and C. M. Campbell.¹ (¹USDA Crops Research Division, State College, Miss.)

Cereal Chem. 40(4): 436-442. July 1963.

Common hybrids of commercially grown yellow corns supply only part of the xanthophyll pigments desired in poultry rations. Xanthophylls of typical double-cross hybrid yellow dent corns varied from 10-30 ppm. and carotenes from 1-4 ppm. The feasibility of breeding high-xanthophyll corn was investigated by a preliminary screening of selected inbred and exotic corn lines of known genetic background. Several inbred samples look promising as sources of the high-xanthophyll character at the 50-ppm. level. Some exotic strains from South America, particularly Argentina, contained approximately 60 ppm. xanthophylls, which is the highest level found to date. The degree of yellow pigmentation in a cross section of the endosperm was used for preliminary visual estimation since outward appearance of the intact seed was not correlated with xanthophyll content. Analyses of several samples indicate that xanthophylls and carotenes may be independently inherited.

1555 CORN DRY-MILLING: EFFECTS OF FIRST-TEMPER MOISTURE, SCREEN PERFORATION, AND ROTOR SPEED ON BEALL DEGERMINATOR THROUGHPUT AND PRODUCTS.

O. L. Brekke, L. A. Weinecke, J. N. Boyd,¹ and E. L. Griffin, Jr. (¹ARS Biometrical Services, Beltsville, Md.)

Cereal Chem. 40(4): 423-429. July 1963.

A statistically planned series of pilot-plant experiments on a single lot of yellow dent, hybrid corn provided quantitative data on effects of three variables upon degerminator throughput, product yields, and product characteristics. Screen perforation (14/-, 16/-, and 18/64-in.) had the greatest quantitative effect; first temper moisture (to levels of 18, 21, and 24%) ranked a poor second; and rotor speed (690, 785, and 880 rpm.), third. Moisture, however, influenced the greatest number of factors. Based upon statistical analysis, the recommended level of each variable for desired yield and characteristics of specific fractions is given.

1556 STIMULATION OF CAROTENOGENESIS IN BLAKESLEA TRISPORA BY ESSENTIAL CITRUS OILS.

Alex Ciegler, George E. N. Nelson, and Harlow H. Hall.
Nature 198(4887): 1305-1306. June 29, 1963.

Essential citrus oils (tangerine, grapefruit, and orange) enhance carotene synthesis by mated cultures of Blakeslea trispora in shaken-flask fermentation. A colorless oil, separated by column chromatography from the essential oils, is responsible for most of the activity. This colorless oil was identified as limonene by means of gas chromatography, carbon and hydrogen analyses, refractive index, and boiling range.

1557 GUMS SEPARATED FROM CROTALARIA INTERMEDIA AND OTHER LEGUMINOUS SEEDS BY DRY MILLING.

H. L. Tookey, V. F. Pfeifer, and C. R. Martin.
J. Agr. Food Chem. 11(4): 317-321. July/August 1963.

Galactomannan gums were separated by a dry-milling process from the leguminous seeds Crotalaria intermedia, Cyamopsis tetragonoloba (guar), and Cassia marilandica. The process included impact grinding, air-classification, and screening to separate coarse endosperm particles; then flaking and grinding of the endosperm to flour. The endosperm material from Crotalaria intermedia was heat-treated to stabilize the viscosity of aqueous dispersions. Yield of good quality gum from each of the three species amounted to over 20% of the original seed weight. Crotalaria gum may be dispersed in either cold or hot water to form viscous solutions that are stable from pH 5-9. The gum should be useful as a dispersing, stabilizing, or thickening agent. Laboratory experiments indicated its potential for use as a wet-end additive to increase strength properties of paper.

1558 ULTRACENTRIFUGAL EXTRAPOLATED MOLECULAR WEIGHTS OF POLYELECTROLYTES

Stig R. Erlander.
Makromol. Chem. 65: 91-95. July 1963.

The extrapolated ultracentrifugal molecular weight for a polyelectrolyte in a polar solvent is shown to be equal to $M^{ext} = M_p - Z_p M_B$, where M_p is the true molecular weight of the polyelectrolyte, Z_p is its electrostatic charge, and M_B is the molecular weight of a low molecular weight electrolyte. This relationship is shown to be true for a polyelectrolyte in the absence or presence of added salt. Hence, the relationship $M^{ext} = M_p / (1 + Z_p)$ is never obtained for a polyelectrolyte for equilibrium ultracentrifugation in a polar solvent.

1559 THE EFFECT OF THE DIPOLE MOMENT ON THE SECOND VIRIAL COEFFICIENT OF POLYELECTROLYTES.

Stig R. Erlander.

Makromol. Chem. 65: 96-100. July 1963.

The basic equations for equilibrium ultracentrifugation of polyelectrolytes were examined. It was concluded that if a polyelectrolyte possesses a permanent dipole moment such as zwitterions or if one polyelectrolyte molecule is capable of inducing a dipole moment on another, then this permanent or induced dipole moment may appreciably decrease the concentration dependence in molecular weight determinations.

1560 ALCOHOL WASHING OF SOYBEAN PROTEIN.

A. C. Eldridge, W. J. Wolf, A. M. Nash, and A. K. Smith.

J. Agr. Food Chem. 11(4): 323-328. July/August 1963.

Soybean protein isolated by acidification of an aqueous extract of hexane-defatted soybean meal contains 2-4% of a phospholipidlike material. These lipids cannot be removed by isoelectric precipitation, washing with water, dialysis, or ammonium sulfate precipitation. However, they are extractable with aqueous alcohols. The concentration of alcohol used to wash the protein has a pronounced effect on the amount of material removed and on the nitrogen content of the extracted protein. Optimum concentrations of alcohol are: methyl, 95-97% (v./v.); ethyl, 84-88% (v./v.); and isopropyl, 78-88% (v./v.). The effects of extraction time, temperature, pH, and solvent to protein ratio were also studied.

The washed protein has improved color and flavor and produces extremely stable, low density foams and whips similar to egg white and commercially available soy products.

1561 A PRACTICAL MODEL FOR AN ANODE REACTION: OXIDATION OF IODATE.

E. B. Lancaster and H. F. Conway.

Electrochem. Technol. 1(7-8): 253-256. July/August 1963.

Oxidation of iodate ion to periodate ion at a lead oxide anode is interpreted as a catalytically controlled chemical reaction in which iodate oxidation competes with molecular oxygen formation for the material that is the precursor for both reactions. The observed data are shown to fit the mathematical equations that are derived. Criteria for judging cell performance are developed, and the model is used successfully to predict the operation of a continuous system.

1562 THE ACETYLENIC ACID IN COMANDRA PALLIDA AND OSYRIS ALBA SEED OILS.

K. L. Mikolajczak, F. R. Earle, and I. A. Wolff.

J. Am. Oil Chemists' Soc. 40(8): 342-343. August 1963.

Gas-liquid chromatographic (GLC) analyses are reported for fatty acid methyl esters from seed oils of two previously unreported species of Santalaceae, Comandra pallida A. DC. and Osyris alba L. The major component in each (43 and 57%, respectively) is an enynoic acid, probably trans-11-octadecen-9-ynoic (ximenynic), found in seed oils of other members of this family. Equivalent chain lengths by GLC analysis and infrared and ultraviolet spectra agree with those obtained by our

analyses of Ximenia americana L., in which ximenynic acid is known to occur. The spectral data also agree with those in literature reports on ximenynic acid. The positions of unsaturation have, however, not been rigorously established for the two species newly reported.

1563 * INDUSTRIAL UTILIZATION OF GRAIN SORGHUM: ACHIEVEMENTS AND CHALLENGES.
F. R. Senti.

Proc. 3rd Grain Sorghum Research and Utilization Conf., sponsored by the Grain Sorghum Producers Association at Amarillo, Texas, March 12-13, 1963, pp. 5-10.

Dialdehyde starch and new polysaccharide gums from fermentation are cited as examples of recent research now adopted commercially. New applications of starch and sorghum flours and new milling processes to provide a wider variety of flours are discussed. Domestic contract research and foreign research programs provide further means to achieve new applications of grain sorghums.

1565 DIALDEHYDE STARCH HYDRAZONES--CATIONIC AGENTS FOR WET-STRENGTH PAPER.

G. E. Hamerstrand, B. T. Hofreiter, D. J. Kay, and C. E. Rist.
Tappi 46(7): 400-404. July 1963.

Cationic-dialdehyde starches have been prepared and evaluated as wet-end additives for the development of wet strength with five representative commercial pulps. Simultaneous "cationization" and dispersion of dialdehyde starch (DAS) in water were achieved conveniently by a brief heating at 92°C. of DAS suspensions in water to which was added from 2-14% by weight (DAS basis) of hydrazides having either tertiary or quaternary amine groups. Extensive evaluations of DAS-betaine-hydrazone dispersions have shown that derivatization involving 2.5% of the carbonyl groups in DAS is optimum in providing maximum retention. High retention was obtained with cationic-DAS following a 3-minute contact time at pH 4.5.

All the desirable properties imparted to paper by DAS in combination with a cationic-starch retention aid, such as increased dry strength, "off-machine" development of full wet strength, and ease of recovery of broke, are also imparted by cationic-DAS. A single addition of a dispersion of cationic-DAS is more efficient and practicable than procedures requiring two-step sequential additions of a retention aid and a bisulfite dispersion of DAS.

1566 * PROGRESSI NELLA TECNOLOGIA DELLA FABBRICAZIONE DI GLUTINE VITALE E DI AMIDO DI FRUMENTO. [PROGRESS IN TECHNOLOGY OF MAKING VITAL WHEAT GLUTEN AND WHEAT STARCH.]

Roy A. Anderson.

Quaderni Merceologia 1(1): 69-88. 1962.

Although the ancient Egyptians and Greeks recovered starch from wheat, the technology of wheat starch and gluten manufacture has progressed slowly over the centuries. The Martin process, the most widely used in modern times, has changed little in basic technology since its invention around 1835. Some modifications in equipment have taken place, but the process has remained primarily a batch operation in which large quantities of water and considerable labor and power are used.

Chemical engineers at the Northern Division have developed an improved batter process for manufacturing gluten and starch from wheat flour. This procedure is continuous in nature, utilizes simple conventional equipment, and requires a minimum amount of labor, power, and water. The process yields products of uniform quality and composition, and can be applied to flours from many different types of wheat.

1567 * HORIZONS IN FERMENTATION AS VIEWED BY THE DEVELOPMENT ENGINEER.

Richard W. Jackson.

"Recent Progress in Microbiology, VIII," ed. N. E. Gibbons, Proc. Symp. VIII Intern. Congr. Microbiol., Montreal, 1962, pp. 364-370. 1963.

The role of substrates in fermentation processes, particularly molasses and grain carbohydrate, are discussed, with attention to other possible cheap materials like cellulose, petroleum, and materials made from petroleum. The use of special substrates in "one-step" fermentative conversions to organic products is reviewed and their future possibilities gauged. General technology involved in fermentations is considered with a look toward increasing future use of simplified systems, especially with enzymes prepared from microorganisms.

1568 SPECTROPHOTOMETRIC METHOD FOR DETERMINING CATIONIC EFFICIENCY OF PULP-CATIONIC STARCH COMPLEXES.

C. L. Mehlretter, F. B. Weakley, M. Louise Ashby, D. W. Herlocker, and C. E. Rist.

Tappi 46(8): 506-508. August 1963.

Relative cationic effectiveness of cationic starches retained on cellulosic pulp was determined by a spectrophotometric method that utilizes a pigment dispersed by an anionic agent. The procedure involves the measurement of absorption of the pigment through attraction by the positively charged cationic starch-pulp complexes. The relationship of color-binding ability to starch retention and to the degree of cationic group substitution in starch is shown for a series of tertiary amine starch ethers. The method rapidly determines significant differences between cationic starches applied to cellulosic pulp for retention of anionic wet-end additives. Consequently, the screening of numerous and diverse application conditions associated with wet-end additions requiring retention aids can readily be accomplished.

1569 HYDROGEN-ION EQUILIBRIA OF WHEAT GLUTEN.

Ying Victor Wu and Robert J. Dimler.

Arch. Biochem. Biophys. 102(2): 230-237. August 1963.

Hydrogen-ion titration curves of wheat gluten have been studied in 3M urea plus 0.15M KCl at 25°C. Ionizing groups per 10^5 grams of gluten and their intrinsic pK 's at 25°C. are: 29 carboxyl (4.77), 15 imidazole (6.43), 2 α -amino (8.4), 1 sulfhydryl (10.1), 20 tyrosyl (10.26), and 9 lysyl (10.78). The guanidyl groups ($pK > 13$) affect the titration curve only through the net charge, Z , of gluten. The ionizing groups all appear to be normal although the intrinsic pK of the imidazole groups is on the low side. The empirical electrostatic factor w at acid pH was considerably larger than it was at alkaline pH, and this difference suggests a

conformation change has occurred. The titration results agree with the amino acid and other analyses within experimental error.

- 1570 CROSS-LINKED WHEAT FLOUR XANTHATE-WOOD PULP BLENDS FOR INSULATING BOARD.
T. R. Naffziger, C. L. Swanson, B. T. Hofreiter, C. R. Russell,
and C. E. Rist.
Tappi 46(7): 428-431. July 1963.

Tentative procedures have been studied for incorporation into insulating board at 5-20% by weight of highly insoluble forms of wheat flour resulting from crosslinking flour xanthates (D.S. 0.19-0.65). The crosslinked cereal derivatives were obtained by reacting cereal xanthates with either an oxidizing agent or a heavy metal salt in the presence of wood pulp.

Basic variants in boardmaking were degree of substitution of xanthated wheat flour, level of application to loblolly pine groundwood, pulp furnish consistency, and crosslinking agent. Effects of these variables on freeness, density, retention, strength properties, and water resistance were determined. A board, containing 10% crosslinked flour insolubilized by zinc salt and having satisfactory drainage characteristics, had tensile and modulus of rupture values three times those of control boards of equal density.

- 1571 POLYGLUTAMIC ACID PRODUCTION BY BACILLUS SUBTILIS NRRL B-2612 GROWN ON WHEAT GLUTEN.
R. M. Ward, R. F. Anderson, and F. K. Dean
Biotechnol. Bioeng. 5(1): 41-48. March 1963.

Bacillus subtilis NRRL B-2612, isolated at the Northern Division, was used to produce polyglutamic acid from devitalized wheat gluten. Conditions for production of the polypeptide were investigated. When NRRL B-2612 was grown on wheat gluten in shaken flasks with phosphate buffer and salts at pH 6.5, yields of polymer reflected a 25-30% incorporation of glutamic acid into polyglutamic acid. Repeated alcoholic precipitation yielded peptides containing between 45 and 90% D-glutamic acid. Physical and chemical properties of a typical, purified, polyglutamic acid indicated that the product was a gamma-linked polypeptide composed of 75% D-glutamic acid and 25% L-glutamic acid with a molecular weight of approximately 200,000.

- 1573 A SPECTROPHOTOMETRIC METHOD FOR THE MICROESTIMATION OF HYDRAZINE AND PRIMARY HYDRAZIDES.
F. B. Weakley, M. Louise Ashby, and C. L. Mehlretter.
Microchem. J. 7(2): 185-193. August 1963.

A method is described for the estimation of microgram quantities of hydrazine hydrate, monomethylhydrazine, betainehydrazide hydrochloride, and N,N-dimethylglycinehydrazide hydrochloride. The method requires a minimum of manipulation and is based on the reaction of a nitrogenous

reducing substance with ferric iron at 85°C. in acetate buffer solution containing 2,2'-bipyridyl and on the determination of the ferrous-bipyridyl complex spectrophotometrically.

A micro ion-exchange procedure is also described that can be used to separate hydrazine hydrate or betainehydrazide from solutions containing nonadsorbable reducing substances which might interfere in the analysis procedure.

- 1574 AMINO ACID COMPOSITION OF SEEDS FROM 200 ANGIOSPERMOUS PLANT SPECIES.
C. H. VanEtten, R. W. Miller, I. A. Wolff, and Quentin Jones.¹
(¹USDA Crops Research Div., Beltsville, Md.)
J. Agr. Food Chem. 11(5): 399-410. September/October 1963.

Amino acid compositions by ion exchange methods are reported on acid-hydrolyzed seed meals from 134 plant species not previously analyzed. The data obtained, with those from 66 species reported earlier, are evaluated and interpreted together here. Lysine, methionine, arginine, proline, hydroxyproline, and glutamic acid showed the greatest variation. The amino acid composition of seeds shows certain basic, over-all similarities, but there are definite relationships between plant taxonomic classifications and amount of each amino acid present. In some species large amounts of less familiar amino acids, such as albizziin, canavanine, djenkolic acid, 4-hydroxypipericolic acid, and willardiine, were found as well as unidentified compounds. The data may be used for predicting the nutritional quality of the seed protein.

- 1575 SOYBEAN UTILIZATION RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY.
F. R. Senti
Soybean Dig. 23(11): 26-30. September 1963.

Emphasis was placed on basic research directed toward the development of a more stable cooking oil from soybean oil to satisfy anticipated demands for more liquid oil in diets at home and abroad. Research was conducted on the chemical conversion of soybean oil to industrial products from the viewpoint of meeting competition with synthetics by creating new products and by reducing cost or improving efficiency of traditional products. Compositional and processing studies were carried out on soybean meal and its products for the purpose of improving nutritional value of feeds as well as its acceptance in foreign-type foods.

- 1576 UNSATURATED ALDEHYDE OILS BY THE PARTIAL OZONIZATION OF SOYBEAN OIL.
E. H. Pryde, D. E. Anders, H. M. Teeter, and J. C. Cowan.
J. Am. Oil Chemists' Soc. 40(9): 497-499. September 1963.

Aldehyde oils containing an average of one or two aldehyde groups per glyceride molecule were prepared by partial ozonization of soybean oil. Ozonization was carried out in ethyl acetate-methanol solvent, and reduction of the ozonolysis products was done catalytically with palladium on charcoal in the presence of pyridine. Under these conditions, maximum conversion of unsaturated to carbonyl functionality was achieved without saturation of the unozonized double bonds. The products were oils having three different types of functionality: aldehydic, olefinic, and glyceride ester.

- 1577 ENZYMATIC PROCESS FOR MUSTARD SEED TO PRODUCE OIL, MEAL, AND ALLYL ISOTHIOCYANATE.
G. C. Mustakas, E. L. Griffin, Jr., E. A. Gastrock,¹ E. L. D'Aquin,¹ E. J. Keating,¹ and E. L. Patton.¹ (¹South. Util. Res. Developmt. Div., New Orleans, La.)
Biotechnol. Bioeng. 5(1): 27-39. March 1963.

Removal of the pungent factor, allyl isothiocyanate, will partly determine whether mustard seed can become a commercial source for oil and meal in the United States. In processing studies at the Northern Division, the mustard glucoside was converted enzymatically and the pungent oil was removed. This process has now been extended to pilot-plant scale by using filtration-extraction equipment at the Southern Division. After desolventization and further steam stripping, the extracted meal had a residual content of 2.9% crude fat and 0.004% allyl isothiocyanate.

- 1578 ARGENTATION IN COUNTERCURRENT DISTRIBUTION TO SEPARATE ISOLOGUES AND GEOMETRIC ISOMERS OF FATTY ACID ESTERS.
C. R. Scholfield, E. P. Jones, R. O. Butterfield, and H. J. Dutton.
Anal. Chem. 35(11): 1588-1591. October 1963.

Mixtures of fatty acid methyl esters were fractionated by counter-current distribution between hexane and 0.2N silver nitrate in 90% methanol. Cis and trans monoenoic esters were separated. With polyenoic esters, separation depends upon both configuration and number of carbon atoms between double bonds.

- 1579 METHODS FOR IMPROVING YIELDS OF CYCLIC ACID FROM LINSEED OIL.
J. P. Friedrich, J. C. Palmer, E. W. Bell, and J. C. Cowan.
J. Am. Oil Chemists' Soc. 40(10): 584-587. October 1963.

Liquid C-18 saturated monocarboxylic acids, which are termed "cyclic acids" because they contain a ring structure, have been prepared by the action of excess sodium hydroxide on linseed oil in ethylene glycol at elevated temperatures followed by distillation and hydrogenation of the resulting free fatty acid monomers and by separation of the straight-chain components by low-temperature crystallization from acetone. In a survey of other possible catalysts and reaction conditions, cyclic acid yields were improved from the previously reported 32.4 grams to 41.4 grams of cyclic acid per 100 grams linseed oil by removing water from the starting materials and using the sodium salt of ethylene glycol as catalyst. The corresponding amount of polymer formed decreased due to a decrease in hydroxylation and subsequent polyester formation.

- 1580 INVESTIGATIONS OF TEMPEH, AN INDONESIAN FOOD.
C. W. Hesseltine, Mabel Smith, Barbara Bradle, and Ko Swan Djien.
"Developments in Industrial Microbiology," vol. 4, pp. 275-287.
Washington, D. C. 1963. Proc. 19th Gen. Meeting, Soc. Ind. Microbiol., Corvallis, Oregon, August 28-31, 1962.

Tempeh is made in Indonesia with mixed cultures that appear to be largely Rhizopus oligosporus, of which NRRL 2710 is typical. We

prepared tempeh by pure culture fermentation with 39 strains of Rhizopus representing 5 species. A satisfactory laboratory-scale fermentation is described, based on a 20- or 24-hour fermentation of dehulled whole beans with R. oligosporus. Full-fat grits may also be used. The temperature of the fermentation could range from 20°-40°C. with 4 out of 5 Rhizopus species. The tempeh-producing strains were characterized as to carbon and nitrogen source required for growth. All strains grew on soybean oil, xylose, glucose, galactose, trehalose, and cellobiose. None grew on i-erythritol, lactose, raffinose, or inulin. The best nitrogen sources were asparagine and ammonium sulfate.

The ability to produce amylase, protease, or pectinase varied among the strains studied. No amylase activity was detected in strains of R. stolonifer compared to rapid starch hydrolysis by all isolates of R. oryzae; R. oligosporus formed only small amounts of amylase after a considerable time--longer than required to make tempeh. Proteases appeared high in the strains of R. oligosporus, but no activity was encountered in R. stolonifer. Pectinase activity was high in R. arrhizus NRRL 1526 but was hardly detectable among the R. oligosporus isolates. Gilbertella persicaria, a fruit-decaying isolate, gave an even higher pectinase activity than did NRRL 1526.

The best way to preserve tempeh is to slice the raw cake and boil the slices sufficiently to destroy the mold and enzymes. The slices may be frozen until ready to be cooked. Neither tempeh nor unfermented boiled soybeans change in methionine content during fermentation. All soybeans tested were suitable for making tempeh.

1581 CORN DRY-MILLING: EFFECT OF BEALL DEGERMINATOR TAIL-GATE CONFIGURATION ON PRODUCT STREAMS.

L. A. Weinecke, O. L. Brekke, and E. L. Griffin, Jr.
Cereal Chem. 40(5): 575-581. September 1963.

Product streams from pilot-plant runs on a No. 0 Beall degerminator equipped with annular tail-gate opening of variable position and fixed area, or of only variable area, are compared with products from V-notched slide or conventionally hinged tail gates for a range of machine throughputs and tail-gate openings. Each type of gate gave superior performance for a particular product quality, such as oil recovery or hull release, but the hinged gate gave better average results for all desirable product properties.

1582 * POLYSACCHARIDES.

Ralph F. Anderson.

"Biochemistry of Industrial Micro-organisms," eds. C. Rainbow and A. H. Rose, chap. 8, pp. 300-319. London. 1963.

The history and development of gums produced by micro-organisms are reviewed. Enzymic reactions involved in the synthesis of homo- and polysaccharides are described, particularly from the standpoint of biochemical engineers, as well as developmental research on microbial gums.

- 1583 CAROTENOIDS OF CORN AND SORGHUM. V. DISTRIBUTION OF XANTHOPHYLLS AND CAROTENES IN HAND-DISSECTED AND DRY-MILLED FRACTIONS OF YELLOW DENT CORN. C. W. Blessin, J. D. Brecher, and R. J. Dimler. Cereal Chem. 40(5): 582-586. September 1963.

Three lots of whole yellow corn were hand-dissected into bran, germ, floury endosperm, and horny endosperm. Two of the corns were varieties representative of those grown in the central Corn Belt; the third was a mixture used for commercial dry-milling. Components from each lot were analyzed for xanthophylls and carotenes. Fractions from commercial dry-milling of the mixture were analyzed for comparative purposes. Average carotenoid contents of hand-dissected fractions in ppm. were: whole corn, 19.2; bran, 1.7; germ, 4.6; floury endosperm, 9.4; and horny endosperm, 27.6. Distribution of carotenoids in the kernel, based on relative weights of the four major fractions in percent were: bran, 1; germ, 3; floury endosperm, 16; and horny endosperm, 80. Carotenoid contents of commercial dry-milled fractions in ppm. were: whole corn mixture, 20.8; bran, 12.2; germ, 9.5; floury endosperm, 17.1; and horny endosperm, 28.8. Xanthophylls comprised the greater portion of carotenoids in all fractions.

- 1584 * RESEARCH FOR NEW USES OF LINSEED OIL.

F. R. Senti.

Proc. Flax Growers Day at 33rd Annual Flax Inst. U. S., Fargo, North Dakota, pp. 8-13. November 15, 1963.

The economic pattern of domestic and world use of linseed oil is described in the light of developing a research program to increase its utilization. The industrial nature of linseed oil and the reactivity of its component fatty acids make it most adaptable to chemical modification. Research progress in two of the most promising areas is detailed--protective coatings and industrial chemicals, including cyclic acids, aldehyde oil products, and new polymerizable esters.

- 1585 PHYSICAL PROPERTIES OF ALCOHOL-EXTRACTED SOYBEAN PROTEINS.

W. J. Wolf, A. C. Eldridge, and G. E. Babcock.

Cereal Chem. 40(5): 504-514. September 1963.

Isolated soybean proteins contain phospholipidlike materials which are extractable with aqueous alcohols. Since alcohols are protein denaturants, their effects on the physical properties of soybean proteins were investigated. Solubility of freeze-dried, isoelectric-precipitated soybean proteins in pH 7.6, 0.5 ionic strength, phosphate buffer was 59%. In the presence of 0.01M mercaptoethanol, solubility in buffer increased to 80% as a result of depolymerization of disulfide polymers of the 7S and 11S ultracentrifugal components. Extraction of the proteins for 2 hours at 25°C. with 94% methanol, 83% ethanol, or 77% isopropanol decreased solubility (in the presence of mercaptoethanol) to 66-71%. Water-saturated butanol decreased solubility to 25%. The 7S and 11S components accounted for most of the protein insolubility. Loss of protein solubility apparently is caused by denaturation rather than by extraction of phospholipids by the alcohols. Optical rotation, viscosity, and ultracentrifugal measurements indicate that the proteins which retain their solubility are undenatured. Purified 11S component,

in which the sulfhydryl groups are blocked with N-ethylmaleimide, forms soluble aggregates upon extraction with 83% ethanol. Extent of aggregation was reduced at low extraction temperatures.

1586 PREPARATION OF ALUMINUM LACTATE.

R. W. Jones and J. E. Cluskey.

Cereal Chem. 40(5): 589-591. September 1963.

A laboratory procedure is given in a Communication to the Editor for preparing aluminum lactate to be used in buffers for the electrophoresis of wheat gluten proteins.

1587 FEEDING STUDIES ON SOYBEANS. GROWTH AND PANCREATIC HYPERTROPHY IN RATS FED SOYBEAN MEAL FRACTIONS.

J. J. Rackis, A. K. Smith, A. M. Nash, D. J. Robbins,¹ and A. N. Booth.¹
(¹Western Util. Res. Devlpmt. Div., Albany, Calif.)
Cereal Chem. 40(5): 531-538. September 1963.

Rats were fed either raw or toasted soybean meal, acid-precipitated protein, whey solids, and whey protein. Weight gains, protein efficiencies, and pancreas weights were determined. As measured chemically, all raw products contained widely different levels of trypsin inhibitor activity; and for some fractions there was no direct relationship between trypsin inhibitor activity, growth inhibition, and pancreatic hypertrophy. Autoclaving of the meal and residue significantly increased weight gains and protein efficiency values, and decreased pancreatic hypertrophy. The residue contains a pancreatic hypertrophic factor that is relatively heat-stable. Autoclaving had no effect on the nutritive value of the acid-precipitated protein. Only slight pancreatic hypertrophy occurred in rats fed raw acid-precipitated protein.

Poor growth, low protein efficiency, and pancreatic hypertrophy occurred with rats fed casein diets containing raw soybean whey solids and whey protein. Trypsin inhibitor activity of these diets was very high. Better weight gains and higher protein efficiency values were obtained with casein supplemented with toasted whey protein than with casein alone. Significant pancreatic hypertrophy also occurred in rats fed autoclaved whey protein.

1588 OIL AND PROTEIN CONTENT OF CORN INBRED LINES.

F. R. Earle, J. J. Curtis, and J. E. Hubbard.

North. Util. Res. Devlpmt. Div., Agr. Res. Serv., U. S. Dept. Agr.
ARS-71-31. November 1963. 15 pp. [Processed]

Oil and protein composition was determined on 145 inbred lines of corn grown at 4 locations in 1948. Up to 20 lines were also analyzed from 8 additional locations in 1948 and from 12 locations in 1949. The inbreds (average from 4 stations in 1948) ranged in oil content from 2.8-5.8%, and in protein content from 9.4-15.8%. The proportion of nitrogen that was alcohol soluble was determined for the 145 inbreds grown at 1 location; it ranged from 42.2-61.0%. The variation in composition was studied statistically for seven lines grown at eight locations both years.

For both oil and protein the inbred line was highly significant (1% level) in determining composition; neither location nor season had a significant effect. However, the interaction location X season was statistically significant at the 1% level in determining both oil and protein. The inbred X location interaction was not significant, and there is no test of significance for the other interactions.

1589 PREPARATION AND PROPERTIES OF DIALDITYLAMINES.

J. E. Hodge and B. F. Moy.

J. Org. Chem. 28(10): 2784-2789. October 1963.

Dialditylamine hydrochlorides are prepared in yields of about 66% from D-glucose, D-mannose, D-galactose, and D-arabinose. The crystalline free bases, N-acetyl derivatives, and some copper chelate salts were prepared. The optical rotations of the mono- and dialditylamines are correlated with structure. Improved methods for making mono- and di-D-glucosylamine and their N-acetyl derivatives are given.

1590 STARCH ACETALS. I. REACTION OF STARCH WITH 3,4-DIHYDRO-2H-PYRAN.

Ollidene Weaver, C. R. Russell, and C. E. Rist.

J. Org. Chem. 28(10): 2838-2840. October 1963.

Starch dispersed in dimethyl sulfoxide was reacted with 3,4-dihydro-2H-pyran at 50°C. in the presence of catalytic amounts of hydrogen chloride. Acetals thus prepared ranged in degree of substitution (D.S.) from 0.03-2.6. It was necessary to use dimethyl sulfoxide as a starch solvent to obtain products having appreciable D.S. In the presence of dimethyl sulfoxide the D.S. depended largely upon the concentration of dihydropyran although reaction time, temperature, and catalyst concentration had some effect. The products showed a broad range of solubility.

1591 DIMETHYL SULFOXIDE AS SOLVENT FOR AMINO NITROGEN DETERMINATION ON CEREAL PROTEINS BY THE VAN SLYKE MANOMETRIC METHOD.

L. H. Krull, J. S. Wall, and R. J. Dimler.

Anal. Biochem. 6(4): 375-380. October 1963.

The standard manometric nitrous acid procedure of Van Slyke for amino nitrogen is not readily applicable to prolamines or glutelin, such as wheat and corn zein, due to the insolubility of these proteins in the reaction media. When dissolved in 80% dimethyl sulfoxide-20% 1N acetic acid, both of these proteins remained in solution upon addition of the nitrous acid reaction mixture and their deamination was then carried out quantitatively in a single-phase system in 30 minutes. Minimum peptide molecular weights, based on terminal amino groups calculated from the data corrected for epsilon lysine amino groups, were 23,000 for gluten and 18,000 for native zein. The method was also useful in evaluating the extent of peptide during chemical modification of these proteins.

1592 FRACTIONATING COMMERCIAL FLOURS & GRITS FROM GRAIN SORGHUM.

A. J. Peplinski, A. C. Stringfellow, and L. H. Burbridge.

Am. Miller 91(10): 10-12, 14. October 1963.

Commercially produced flours and grits from grain sorghum were fractionated by fine grinding and air classification to examine the range of compositions obtainable. Commercial flours yielded fractions in which the protein content varied from 4.6-22.1%; commercial grits, from 5.6-15.0%. Floury endosperm separated from the grits by reduction milling contained considerably less protein than the starting grits. A small fraction containing only 1.6% protein was separated from floury endosperm although one containing 3.0% protein could be separated at a yield of about 17% from grits.

1593 BETA-CAROTENE PRODUCTION IN 20-LITER FERMENTORS.

Alex Ciegler, Adolph A. Lagoda, Virgil E. Sohns, Harlow H. Hall, and Richard W. Jackson.

Biotechnol. Bioeng. 5(2): 109-121. June 1963.

Microbiological production of beta-carotene previously investigated in shaken-flask culture has been scaled-up to 20-liter fermentors containing an operating volume of 10 liters. Yields obtained in shaken flasks, approximately 100 mg./100 ml., have been reproduced with a fermentation time of 72 hours. Factors affecting the fermentation (inoculum, mash ingredients, and environmental conditions) were investigated, and typical data are presented. A preliminary cost analysis indicates a "cost to make" of \$31.35/kilogram of carotene contained in the dried fermentation solids.

1594 * ISOLATION AND CHARACTERIZATION OF SOYBEAN TRYPSIN INHIBITORS.

J. J. Rackis.

Proc. Seed Protein Conf., sponsored by South. Util. Res. Devlpmt. Div., New Orleans, La., pp. 98-108. January 21-23, 1963.

Two highly purified trypsin inhibitors, designated SBTIA₁ and A₂, have been isolated from soybeans by chromatography on DEAE-cellulose. The use of ultracentrifugation, electrophoresis, chromatography, and trypsin-inhibitor activity as criteria of homogeneity is discussed.

When operating under conditions of near 100% adsorption of whey protein to DEAE-cellulose (0.01M potassium phosphate buffer, pH 7.6, and protein charge of 5-30 mg./2.8 g. of resin), the proteins were eluted with increasing concentrations of sodium chloride in direct relation to their net negative charge. In addition, SBTIA₁ and A₂ had an R_f of either 0 or 1 depending upon the sodium chloride concentration in the eluant. A chromatographic procedure was developed for the simultaneous isolation of SBTIA₁ and A₂ directly from the whey protein fraction of raw soybean meal.

1595 * RECENT ADVANCES IN THE CHEMISTRY OF SOYBEAN PROTEINS.

W. J. Wolf.

Proc. Seed Protein Conf., sponsored by South. Util. Res. Devlpmt. Div., New Orleans, La., pp. 43-55. January 21-23, 1963.

Soybean globulins can be fractionated by ammonium sulfate precipitation, calcium phosphate chromatography, or selective denaturation with aqueous alcohols. Since stable fractions are

obtained, apparently soybean globulins are a mixture of different proteins. Purification of soybean proteins is complicated by the presence of lipidlike materials in the isolated proteins. Problems associated with the presence of these lipids are discussed.

1596 * STRUCTURAL INVESTIGATIONS OF WHEAT GLIADIN AND GLUTENIN.

John H. Woychik.

Proc. Seed Protein Conf., sponsored by South. Util. Res. Devlpmt. Div., New Orleans, La., pp. 27-39. January 21-23, 1963.

The elasticity and cohesiveness of wheat gluten depend in part on the high molecular weight (2-3 million) of the glutenin fraction. This high weight results from the extensive intermolecular disulfide bonding of the low molecular weight (20,000) polypeptide units. Preliminary structural investigations supported the hypothesis that glutenin is formed from disulfide bonding of gliadin components and possibly water-soluble proteins. Also given is the amino acid composition of gliadin and glutenin as obtained by qualitative end-group analysis and by electrophoresis.

1597 REPRESSIBLE ACID PHOSPHOMONOESTERASE AND CONSTITUTIVE PYROPHOSPHATASE OF SACCHAROMYCES MELLIS.

Ralph Weimberg and William L. Orton.

J. Bacteriol. 86(4): 805-813. October 1963.

Saccharomyces mellis produces a nonspecific acid phosphomonoesterase (pH optimum of 5.5-6.0) when grown in a medium devoid of phosphate. Only minimal amounts of this enzyme are present in cells harvested from media containing phosphate. The enzyme requires no cofactors. It is inhibited by such anions as phosphate, arsenate, molybdate, and borate. S. mellis also contains an inorganic pyrophosphatase with a pH optimum of 7.5. The properties of this enzyme are distinctly different from those of the acid phosphomonoesterase. The pyrophosphatase requires Mg^{++} for activity. This enzyme is constitutive since it is present in all cells regardless of the phosphate content of the growth medium.

1598 RIGID URETHANE FOAMS FROM GLYCOSIDE POLYETHERS.

F. H. Otey, Bonnie L. Zagoren, and C. L. Mehlretter.

Ind. Eng. Chem. Prod. Res. Develop. 2(4): 256-259. December 1963.

Glycosides were made by reacting starch with both ethylene glycol and glycerol in the presence of an acid catalyst. Appropriate polyalkoxylation of the unisolated glycosides with propylene oxide yielded polyethers having favorable viscosities and hydroxyl numbers for application in rigid urethane foams. The preparation and properties of several glycoside polyoxypropylene ethers are described. Rigid urethane foams were prepared from these glycoside polyethers and their corresponding polyether toluene diisocyanate prepolymers. The effects of varying the polyol initiator and the hydroxyl number of the polyether were determined by measuring the physical properties of the foams.

1599 PILOT-PLANT PROCESS FOR THE ISOLATION OF A MICROBIAL POLYSACCHARIDE WITH A QUATERNARY AMMONIUM COMPOUND.

W. J. Albrecht, V. E. Sohns, and S. P. Rogovin.
Biotechnol. Bioeng. 5(2): 91-99. June 1963.

Microbial polysaccharides, which have many potential industrial applications, are receiving more and more attention. One of the economic obstacles to the commercialization of these polysaccharides has been the cost of isolating them from fermented broth. To reduce this cost, a recycling process was developed. The polyanionic polysaccharide synthesized from glucose by activity of the bacterium Xanthomonas campestris NRRL B-1459 is precipitated from the fermented broth with a quaternary ammonium compound (QAC). Chemical assay and the viscosity of water solutions of the isolated polysaccharide indicate no adverse effects on it from recycled QAC. The cost to make this polysaccharide is estimated at \$1.14 a pound. This cost estimate includes land, buildings, raw materials, equipment, labor and supervision, utilities, factory supplies, working capital, and plant overhead.

1600 NEW BACTERIAL POLYSACCHARIDE FROM ARTHROBACTER.

M. C. Cadmus, Helen Gasdorf, A. A. Lagoda, R. F. Anderson, and R. W. Jackson.

Appl. Microbiol. 11(6): 488-492. November 1963.

A bacterial strain (NRRL B-1973) isolated from soil at Guatemala City and tentatively identified as an Arthrobacter species produced a polysaccharide with unusual properties. Conditions were studied for the production of this microbial gum in shaken flasks and 20-liter fermentors. Suitable nutrients for optimum polysaccharide production included 3% glucose, 0.3% enzyme-hydrolyzed casein, magnesium sulfate, manganese sulfate, and potassium phosphate buffer (pH 7.0). Polysaccharide yields ranged from 40-45%, based on initial dextrose in the medium in 3- or 4-day fermentations. The gum was readily recovered from culture fluid by alcohol precipitation in the presence of an electrolyte. The Arthrobacter gum exhibited characteristics unique for a polyelectrolyte. Viscosity of solutions was not decreased by heating in the presence of salt, and the gum withstood a temperature of 121°C. for 30 minutes. At polysaccharide levels above 0.75%, gels were formed when solutions were autoclaved with KCl. There was no significant change in viscosity over a pH range of 5.0-10.0.

1601 SOME LANDMARKS IN THE CHEMICAL TECHNOLOGY OF CARBOHYDRATE OXIDATION.

C. L. Mehlretter.

Die Stärke 15(9): 313-319. September 1963.

A review of the chief technological advances made in carbohydrate oxidation in the past 50 years. Selective oxidation is described for primary, secondary, and vicinal hydroxyl groups of monosaccharides and polysaccharides in which chemical, electrolytic, and catalytic oxidation techniques are utilized. Recent, as well as the older, industrial applications of the products obtained are presented.

1602 STABLE FOAMS FROM UNHYDROLYZED SOYBEAN PROTEIN.

A. C. Eldridge, P. K. Hall, and W. J. Wolf.

Food Technol. 17(12): 120-123. December 1963..

After alcohol washing, unhydrolyzed, acid-precipitated soybean protein can be whipped into extremely stable foams similar in appearance to egg whites and other soy products now commercially available. The purified soybean protein forms stable whips either above or below the isoelectric region (pH 4.0-6.0) of the protein. Heating the whipping dispersion before aeration or increasing the protein concentration enhances foam stability. The whipped products can be baked, browned, flavored, colored, and frozen with no apparent adverse effects. These findings suggest that alcohol-washed soybean protein may be a useful aerating material for the food industry.

1603 FRACTIONATION OF AMYLOMAIZE STARCHES.

R. A. Anderson, C. Vojnovich, and G. Soedomo.¹ (¹Institute for Industrial Research, Djakarta, Indonesia).

Die Stärke 15(10): 355-359. October 1963.

Commercial amylo maize starches with amylose contents as high as 55-60% are now available, and some hybrid corns containing up to 75%-amylose starch have been grown by plant breeders. Because these starches still do not have enough amylose to make them a good raw material from which to make films and fibers, some concentration of the amylose is necessary. Three starches varying in amylose content from 60-75% were fractionated by complexing the amylose with a series of five fatty acids (caprylic, capric, palmitic, stearic, and oleic) and with four fatty alcohols (1-butanol, 1-hexanol, 1-octanol, and 1-decanol). Modifications of techniques described in the literature were necessary to effect good recoveries of quality amylose.

Of the fatty acids, capric gave the amylose product with the best purity. Recovery of amylose was good and amylose content ranged from 82-86% in a single complexing stage. However, the intrinsic viscosities of the amylose concentrates were low unless the pH was controlled during heat dispersion. After the amylo maize starch was pretreated for a few minutes in alkali to get better starch dispersion and then complexed with capric acid, the amylose purities increased to about 90% and the viscosities, to 1 or higher. Similar results were obtained if alcohols were used as complexing agents. Butanol and decanol gave the best results.

1604 DICARBONYLS, REDUCTONES, AND HETEROCYCLICS PRODUCED BY REACTIONS OF REDUCING SUGARS WITH SECONDARY AMINE SALTS.

John E. Hodge, Benjamin E. Fisher, and Earl C. Nelson.

Am. Soc. Brewing Chemists Proc. 1963, pp. 84-92.

Reducing sugars, when heated with secondary amine salts in alcohol and other solvents at 70°-80°C., produce several compounds in the dicarbonyl, pyrone, furan, furenidone, and reductone classes. The heterocyclics isolated and characterized are: 2-methyl-3-hydroxy-1,4-pyrone (maltol) and 2-acetyl-3-hydroxyfuran (isomaltol)--both from

maltose--and 2,5-dimethyl-3-hydroxyfuren-2-one-4 from rhamnose. All three are crystalline subliming solids that give strong caramel-like odors and flavors. In addition, 4- and 6-carbon amino reductones have been synthesized from D-glucose and other hexoses under the same reaction conditions, and their structures have been determined. The formation of all five compounds is explained by the following series of reactions: (1) sugar-amine condensation; (2) 1,2-enolization of the glycosylamine; (3) ketonization of the 1,2-eneaminol (Amadori rearrangement); (4) 2,3-enolization of the 2-ketose; (5) β -elimination of the amine from C-1 to form a $\text{CH}_3\text{-C:O-C:O-}$ structure; (6) enolization or cyclization of the methyl α -dicarbonyl intermediate; and (7) dehydration of the enolic or cyclic structure of the methyl α -dicarbonyl intermediate.

- 1605 EFFECT OF DILUENTS ON VIABILITY OF POPILLIA JAPONICA NEWMAN LARVAE, BACILLUS POPILLIAE DUTKY, AND BACILLUS LENTIMORBUS DUTKY.
Grant St. Julian, Jr., Thomas G. Pridham, and Harlow H. Hall.
J. Insect Pathol. 5(4): 440-450. December 1963.

The viability of larvae of Popillia japonica Newman was determined after injecting into their hemocoel eight different, sterilized diluents commonly used to suspend bacterial cells. Varied killing of the larvae resulted, indicating the need to select diluents on the basis of their effects on the insect in developing a standard test for pathogenicity of milky disease bacteria. The viability of Bacillus popilliae Dutky and B. lentimorbus Dutky, when suspended in these diluents for varying time periods, also was determined. The number of viable cells was influenced by the type of diluent, and decreases occurred when the suspending times were increased. Tryptone in 0.1% concentration was the most satisfactory suspending fluid because of its minimal harmful effect on both larvae and bacteria.

1606 * POLY(AMIDE-ACETALS).

E. H. Pryde and J. C. Cowan.
"High Polymers," vol. XIII "Polyethers," Part I "Polyalkylene Oxides and Other Polyethers," ed. Norman G. Gaylord, section IX of chap. VII, pp. 446-453. New York. 1963.

Poly(amide-acetals) have both amide and acetal groups as recurring units in the polymer backbone and have latent crosslinking properties analogous to poly(ester-acetals). Linear poly(amide-acetals) can be prepared by either a sealed tube system or an atmospheric pressure system. The crosslinked products are transparent, insoluble, infusible, and adhere strongly to glass.

1607 * POLY(ESTER-ACETALS).

E. H. Pryde and J. C. Cowan.
"High Polymers," vol. XIII "Polyethers," Part I "Polyalkylene Oxides and Other Polyethers," ed. Norman G. Gaylord, section VIII of chap. VII, pp. 442-446. New York. 1963.

A relatively new type of polymer, in which both ester and acetal groups are part of the recurring unit in the polymer backbone, are

discussed. A poly(ester-acetal) prepared from the pentaerythritol acetal of methyl azelaaldehyde and excess ethylene glycol by glycolysis reaction is a hard, brittle, and opaque solid having a melting range of 87°-88°C. and a molecular weight of 16,100. This linear poly(ester-acetal) may be crosslinked to an insoluble and infusible polymer strongly adherent to glass through reaction of the acetal functionality.

- 1608 IMMUNOCHEMICAL DIAGNOSIS OF THE LINKAGE OF D-MANNOSE RESIDUES.
Michael Heidelberg and Allene Jeanes († Institute of Microbiology, Rutgers, The State University, New Brunswick, N. J.).
J. Bacteriol. 86(4): 881-882. October 1963.

The results of a simple, rapid immunochemical test were in agreement with the chemical assignment of 1,2- and 1,3-linkages in the phosphomannan from Hansenula holstii NRRL Y-2448.

- 1609 PERMANGANATE OXIDATION OF CORN STARCH.
T. E. Yeates, G. E. Babcock, and C. L. Mehlretter.
Cereal Chem. 40(6): 684-693. November 1963.

The production of functional groups in corn starch by permanganate oxidation has been investigated under both acidic and alkaline conditions. The effect of increasing permanganate oxidation levels on the degree of formation of carbonyl and carboxyl groups was determined with starch at pH 1 and 25°-27°C. and at pH 9-11 and 2°-4°C.

Pasting characteristics of aqueous dispersions of the neutralized oxystarches were observed on a recording Corn Industries Research Foundation viscometer. High initial viscosities were obtained, which declined irreversibly on further heating. The final low viscosities indicated existence of unstable groupings in the oxystarches, which influence polymer degradation under the conditions of pasting. Ultracentrifugal sedimentation of various oxystarches dispersed at 98°C. showed a broad distribution of molecular weights with a considerable proportion in a low molecular-weight range.

- 1610 METHYL AZELAALDEHYDATE PURIFICATION VIA THE BISULFITE COMPOUND.
W. R. Miller, D. J. Moore, and J. G. Fullington.
J. Am. Oil Chemists' Soc. 40(12): 720-721. December 1963.

Methyl azelaaldehyde was obtained in 99.8% purity with 82.5% recovery from the ozonolysis of commercial methyl oleate by separation as the sodium bisulfite addition compound, regeneration with 10% sodium hydroxide, and distillation.

- 1611 FATTY ACIDS, FATTY ALCOHOLS, WAX ESTERS, AND METHYL ESTERS FROM CRAMBE ABYSSINICA AND LUNARIA ANNUA SEED OILS.
T. K. Miwa and I. A. Wolff.
J. Am. Oil Chemists' Soc. 40(12): 742-744. December 1963.

Crambe abyssinica and Lunaria annua, members of the Cruciferae family, have seed oil glycerides containing approximately 55-65% of C22 and C24 unsaturated fatty acids. Fatty acids were prepared by saponification; fatty alcohols, by sodium reduction of glycerides;

liquid wax esters, by p-toluene-sulfonic acid-catalyzed reaction of fatty acids with fatty alcohols; and methyl esters, by reaction of fatty acids with diazomethane. Solid hydrogenated glyceride oils and wax esters were compared with several commercial waxes. Chemical and physical constants were determined for the seed oils and their derivatives. Position of unsaturation in the crambe fatty acids was determined by gas chromatographic analysis of the permanganate-periodate degradation products. The major dicarboxylic acid was brassylic (C_{13}), proving the docosenoic acid to be erucic.

1612 HYDROGEN ION EQUILIBRIA OF WHEAT GLUTENIN AND GLIADIN.

Y. Victor Wu and Robert J. Dimler.

Arch. Biochem. Biophys. 103(3): 310-318. December 1963.

Hydrogen ion titration curves of twice-precipitated wheat glutenin and gliadin have been obtained in 3M urea plus 0.15M KCl at 25°C. The data have been analyzed by equations treating the electrostatic effect as an empirical factor. The ionizing groups per 10^5 grams of glutenin and their intrinsic pK 's at 25°C. were calculated. Empirical values of the electrostatic factor, w , are significantly larger for carboxyl groups than for tyrosyl groups. This change in w suggests that the conformations of both molecules depend on pH.

1613 AMIDE GROUPS AS INTERACTION SITES IN WHEAT GLUTEN PROTEINS: EFFECTS OF AMIDE-ESTER CONVERSION.

A. C. Beckwith, J. S. Wall, and R. J. Dimler.

Arch. Biochem. Biophys. 103(3): 319-330. December 1963.

The side-chain amide groups of gluten and its fractions, glutenin and gliadin, were partially converted to ester groups by reaction with methanol containing hydrogen chloride. The transformation occurred with little cleavage of peptide linkages. Properties that were changed significantly included solubility in various systems, intrinsic viscosity, and cohesion of the hydrated mass. The changes indicate that the large number of side-chain amide groups in wheat gluten and its component proteins participate in association between the protein molecules and also between the proteins and various solvents. The concept of hydrogen bonding provides a reasonable explanation for the association through amide groups and for the effects of amide-ester conversion. The amide groups are also partially responsible for the cohesive and elastic characteristics of hydrated vital wheat gluten.

1614 AIR-CLASSIFICATION RESPONSE OF FLOURS FROM HARD RED WINTER WHEATS AFTER VARIOUS PREMILLING TREATMENTS.

A. C. Stringfellow, V. F. Pfeifer, and E. L. Griffin, Jr.

Northwest. Miller 269(13): 12-15. December 1963; 270(1): 12-13; 16-18. January 1964.
Muhle 101(10): 165; (11): 180-181 (1964)

Wheat is conditioned before milling to increase flour yield and quality, to reduce power requirements during milling, to regulate moisture content of the milled products, and to improve millability. A premilling treatment also affects response of a flour to fractionation by fine grinding and air classification, a process recently introduced into the industry. In an effort to improve the response

of milled flours to fractionation, especially for the recovery of low-protein fractions, HRW wheats from the Midwest were subjected to various treatments before milling: cold, hot, steam, and vacuum conditioning; freezing and thawing; extended storage; wetting and drying; and chemicals application. Fractionation of the milled flours showed some changes in response for some treatments; the greatest changes brought about by premilling treatments caused flour damage. Reprocessing the starchy fraction from conventionally milled HRW flour appeared a more satisfactory procedure to obtain low-protein fractions because the bulk of the flour was not damaged.

- 1615 PAPER CHROMATOGRAPHY OF ALKALOIDS OF TALL FESCUE HAY
Shelly G. Yates.
J. Chromatog. 12(3): 423-426. November 1963.

Alkaloids were extracted from tall fescue hay (*Festuca arundinacea* Schreb.) and separated by paper chromatography. The only known alkaloid present is perloline. The major alkaloids of tall fescue and rye grass are identical. The most abundant alkaloid in tall fescue was isolated by preparative paper chromatography for further characterization.

- 1616 END-USE EVALUATION OF SOME COPOLYMERS AND TERPOLYMERS OF VINYL ETHERS OF LINSEED CONJUGATED FATTY ALCOHOLS.
R. H. Dent,¹ B. G. Brand,¹ H. M. Teeter, and J. C. Cowan (¹Battelle Memorial Institute, Columbus, Ohio.)
J. Am. Oil Chemists' Soc. 40(12): 713-716. December 1963.

Copolymers and terpolymers, based on vinyl ethers from linseed conjugated fatty alcohols and selected as having the most potential for commercial use, were evaluated as chemically resistant coatings, metal-decorating coatings, small-appliance and architectural finishes, wire coatings, and adhesives. These materials have promise in areas where a high-temperature baking schedule can be tolerated and where color is not of prime importance. Good compatibility with most commonly used pigments was observed. As wire coatings, films showed good continuity and had superior dielectric strength and resistance to cut-through; however, improvement in flexibility and adhesion to copper would be needed for successful application. Performance as adhesives was disappointing, since curing in the absence of air was poor. The polymers showed some promise as can coatings, but the need for modifications in them was demonstrated.

CONTRACT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U. S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 113-C PREPARATION AND POLYMERIZATION OF VINYL 12-HYDROXYSTEARATE.
Toshiyuki Shono and C. S. Marvel.
The University of Arizona, Tucson.
J. Polymer Sci., Part A, 1(6): 2067-2074. June 1963.

[Report of research work supported with funds provided by the U. S. Department of Agriculture under the authority of U. S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

- 25-PL-480 A THERMOSTABLE HAEMOLYTIC FACTOR IN SOYBEANS.
Yehudith Birk, A. Bondi, B. Gestetner, and I. Ishaaya.
Hebrew University, Rehovoth, Israel.
Nature 197(4872): 1089-1090. March 16, 1963.
- 26-PL-480 * POLYAMIDES CONTAINING CARBOHYDRATE RESIDUES. PART II. BENZYLIDENEDIOXY-DERIVATIVES.
T. P. Bird, W. A. P. Black, E. T. Dewar, and J. B. Hare.
Arthur D. Little Research Institute.
Musselburgh, Midlothian, Scotland.
J. Chem. Soc. 1963: 3389-3391. June.
- 27-PL-480 RHIZOPUS SEXUALIS FROM SOIL IN INDIA.
Usha Baijal.
University of Allahabad, Allahabad, India.
Current Sci. (India) 32: 186. April 1963.
- 28-PL-480 A NEW SPECIES OF HELICOSTYLUM FROM INDIA.
B. S. Mehrotra and B. R. Mehrotra.
University of Allahabad, Allahabad, India.
Lloydia 26(1): 27-28. March 1963.
- 29-PL-480 POLYMERISATION OF UNSATURATED DERIVATIVES OF 1,2:5,6-DI-O-ISOPROPYLIDENE-D-GLUCOFURANOSE.
W. A. P. Black, E. T. Dewar, and D. Rutherford.
Arthur D. Little Research Institute.
Musselburgh, Midlothian, Scotland.
J. Chem. Soc. 1963: 4433-4439. September.
- 30-PL-480 ATTIVITA' ENZIMATICHE DI ACETOBACTER SUBOXYDANS. I. GLUCOSIODEIDROGENASI.
[Enzymatic Activities of Acetobacter suboxydans. I. Glucose-Dehydrogenases.]
E. Galante, P. Scalaffa, and G. A. Lanzani.
University of Milan, Italy.
Enzymologia 26(1): 23-32. June 1963.
- 31-PL-480 SUI FATTORI SCONOSCIUTI DI CRESCITA DEI "DISTILLER'S DRIED SOLUBLES."
II. LA PRESENZA DELL'ACIDO MEVALONICO NELLA COSIDETTA "VITAMINA B₁₃."
[The Unknown Growth Factors of Distiller's Dried Solubles. II. The Presence of Mevalonic Acid in So-Called Vitamin B₁₃.]
L. Rotta, A. Dansi, A. Dal Pozzo, C. Zanini, and I. Reggianini.
Scientific Institute of Chemistry and Biochemistry, Milan, Italy.
Boll. Chim. Farm. 102(5): 242-246. May 1963.
- 32-PL-480 RICERCHE SULL'AUTOSSIDAZIONE DI SOSTANZE GRASSE POLI-INSATURE. NOTA I.
[Researches on the Autoxidation of Polyunsaturated Fatty Materials. I.]
E. Fedeli, P. Capella, G. Livraghi, G. Acampora, and G. Jacini.
Experiment Station for the Fats and Oils Industries, Milan, Italy.
Riv. Ital. Sostanza Grasse 40(6): 300-307. June 1963.

- 33-PL-480 TWO NEW SPECIES OF MORTIERELLA FROM INDIA.
B. S. Mehrotra, Usha Baijal, and B. R. Mehrotra.
University of Allahabad, Allahabad, India.
Mycologia 55(3): 289-296. May/June 1963.
- 34-PL-480 * UNTERSUCHUNGEN AUF DEM GEBIET DER THERMOPOLYMERISIERTEN PFLANZENÖLE. II. MITTEILUNG. [Studies in the Field of Heat-Polymerized Vegetable Oils. II.]
E. Fedeli, A. Valentini, and G. Jacini.
Experiment Station for the Fats and Oils Industries, Milan, Italy.
Fette, Seifen, Anstrichmittel 65(5): 402-410. May 1963.
- 35-PL-480 LA REAZIONE FITELSON: IDENTIFICAZIONE DELLA STRUTTURA DELLA TEASINA.
[Fitelson's Reaction, Identification of Teasine Structure.]
P. Capella, E. Fedeli, M. Cirimele, and G. Jacini.
Experiment Station for the Fats and Oils Industries, Milan, Italy.
Riv. Ital. Sostanza Grasse 40(6): 296-299. June 1963.
- 36-PL-480 ACCRESCIMENTO MOLECOLARE DEI TERMOPOLIMERI DELL'OLIO DI LINO. NOTA III.
[Molecular Increase of Linseed Oil Thermopolymers. III.]
E. Fedeli, P. Capella, and A. Valentini.
Experiment Station for the Fats and Oils Industries, Milan, Italy.
Riv. Ital. Sostanza Grasse 40(6): 321-329. June 1963.
- 37-PL-480 * A CONTRIBUTION TO THE THEORY OF PERIODATE OXIDATION OF STARCH.
D. Mejzler, J. Schmorak, and M. Lewin.
Institute for Fibres and Forest Products Research
Ministry of Commerce and Industry, Jerusalem, Israel.
J. Appl. Polymer Sci. 7(4): 1557-1563. July 1963.
- 38-PL-480 SEPARATION OF TRITERPENE ALCOHOLS BY VAPOUR PHASE CHROMATOGRAPHY.
P. Capella, E. Fedeli, and M. Cirimele.
Experimental Station for Fats and Oils.
National Centre for Lipochemistry of C.N.R., Milan, Italy.
Chem. & Ind. (London) 1963(39): 1590-1591. September 28.
- 39-PL-480 ANALYSIS OF REVERSIBLY INTERACTING SYSTEMS BY DIFFERENTIAL BOUNDARIES IN ELECTROPHORETIC AND SEDIMENTATION EXPERIMENTS.
G. A. Gilbert¹ and R. C. Ll. Jenkins.² (¹University of Birmingham, Birmingham, England, and ²Portsmouth College of Technology, Portsmouth, England.)
Nature 199(4894): 688. August 17, 1963.
- 40-PL-480 THE CHEMICAL AND PHYSICOCHEMICAL PROPERTIES OF WHEAT STARCH MILDLY OXIDIZED WITH ALKALINE SODIUM HYPOCHLORITE.
J. Schmorak and M. Lewin.
Institute for Fibres and Forest Products Research
Ministry of Commerce and Industry, Jerusalem, Israel.
J. Polymer Sci., Part A, 1(8): 2601-2620. August 1963.
- 41-PL-480 * ANTIOXIDANTS IN OATS: ESTERS OF PHENOLIC ACIDS.
D. G. H. Daniels, H. G. C. King, and H. F. Martin.
J. Sci. Food Agr. 14(6): 385-390. June 1963.

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C. 20231.]

METHOD OF INCREASING THE VISCOSITY OF AN AQUEOUS SOLUTION OF A DEACETYLATED POLYSACCHARIDE.

Allene R. Jeanes and James H. Sloneker.
U. S. Patent 3,096,293. July 2, 1963.

A method of substantially increasing the viscosity of a 0.25-1.0% aqueous solution of the alkali-deacetylated derivative of the native polysaccharide B-1459 comprising adding about from 0.25-5.0% of a member selected from the group consisting of borax, calcium acetate, and potassium chloride thereto, said native polysaccharide B-1459 having been produced by the whole culture fermentation of Xanthomonas campestris NRRL B-1459 under aerobic conditions for about from 72-96 hours and then isolated, and being the acetyl-ester form of a polymer comprising mannose, glucose, and glucuronic acid (as the potassium salt) in the approximate ratio of 2:1:1 and in which the acetyl group comprises 4.7% of the native polymer and is present as the ester of a sugar alcohol hydroxyl group, the alkali-deacetylated derivative of said polysaccharide B-1459 having been obtained by forming a mixture containing water, potassium chloride, potassium hydroxide, and the isolated polysaccharide in the absence of oxygen whereby the polysaccharide is substantially deacetylated, adjusting the pH of the resulting mixture to neutrality, mixing methanol with the neutralized mixture to precipitate the deacetylated polysaccharide, and isolating the deacetylated polysaccharide.

UNIFORM RESIDENCE HOPPER ASSEMBLY.

Laurence A. Weinecke and Ordean L. Brekke.
U. S. Patent 3,103,287. September 10, 1963.

A hopper assembly that uniformly provides any predetermined retention period for continuously received particulate matter, such as freshly moistened, insufficiently tempered, corn kernels, said assembly comprising a rotary funnel and angled ejection spout supported on a controllably driven vertical shaft; in gravity relation a stationary annular space formed between widely spaced tubes that are both concentric to said vertical shaft, said annular space being radially subdivided by vertical inserts to form equal segments corresponding in number to the number of equal capacity, substantially vertical hopper retention chambers above which their funnel-like outlets respectively discharge; a rectangular receptacle subdivided into equal capacity side-by-side, unilaterally biased transverse chambers by alternating vertical partitions and biased baffle plates supported on transversely hemicylindrical divider blocks

so arranged as to form below the slit-like outlet at the bottom of each hopper chamber a respective transversely disposed cylindrical space containing a respective transversely disposed rotor shaft having at least three transversely disposed vanes so attached as to be in sweeping relationship to said slot-like outlet and to the hemicylindrical walls of said divider blocks; means for uniformly activating the vertical and the horizontal rotor elements.

METHOD OF OBTAINING DETOXIFIED MUSTARD SEED PRODUCTS.

Gus C. Mustakas and Larry D. Kirk.

U. S. Patent 3,106,469. October 8, 1963.

An improved commercially adaptable process for obtaining detoxified mustard seed meal, bland mustard seed oil, and recoverable allyl isothiocyanate comprises the steps of adding about 0.3 parts of freshly ground mustard seed meal to 100 parts of finely ground heat-treated and substantially dried mustard seed, adding water to provide a moisture content of 15-16% in the meals, mixing and heating at 50°C. for about 15 minutes to permit enzymatic hydrolysis of allyl isothiocyanate from its glucoside, raising the temperature to above 100°C. to drive off substantially all of the allyl isothiocyanate and moisture, cooling to room temperature, solvent-extracting the meal, desolventizing the meal, and steaming the same.

UNSATURATED ALDEHYDE OILS AND METHOD FOR PREPARING THE SAME.

Everett H. Pryde and Donald E. Anders.

U. S. Patent 3,112,329. November 26, 1963.

Soybean and related triene-containing vegetable oils have been ozonized to extents of about 37-80% of theory in a 4:1 solvent mixture of ethyl acetate and methanol and then catalytically hydrogenated in the same solvent mixture containing 8-12% of added pyridine to obtain high yields of monoaldehydic to trialdehydic triglycerides containing residual olefinic unsaturation and fatty aldehydes such as caproaldehyde and pelargonaldehyde. Pyridine favors a disadvantageous competitive reaction if it is present during the ozonization, but when added only for the preferred catalytic hydrogenation step, preserves the olefinic unsaturation and makes the yields equal those obtained upon chemical reduction with zinc and acetic acid.

MICROBIAL PRODUCTION OF 10-HYDROXYSTEARIC ACID.

Lowell L. Wallen.

U. S. Patent 3,115,442. December 24, 1963.

Hydration of the 9,10 double bond of oleic acid to provide the more valuable 10-hydroxystearic acid is accomplished by adding a low concentration of oleic acid to an aerobic fermentation of the apparent pseudomonad NRRL B-2994 in a buffered yeast extract medium free of the conventional trace metals and adjusted to pH 8.0 with alkali. Pure 10-hydroxystearic acid has been obtained in yields of 14% from a 48-hour shake-flask fermentation that has been inoculated with only a single loop transfer of the organism.

CROTALARIA INTERMEDIA ENDOSPERM PRODUCT AND METHOD OF PREPARING THE SAME.

Harvey L. Tookey and Virgil F. Pfeifer.

U. S. Patent 3,116,281. December 31, 1963.

A hydrophilic mucilaginous galactomannan gum product that is apparently free of toxic alkaloids originally present in the source is obtained by subjecting the seeds of Crotalaria intermedia to impact at a speed of 350-500 feet per second to produce endosperm particles that essentially exceed 0.0117 inch in size (50 mesh) and germ and hull particles that are smaller and can be separated from the endosperm particles by air classifying and screening. The Crotalaria intermedia endosperm particles may be made still more readily water-dispersible by flaking between smooth rolls without tempering and then powdering the flakes in a hammer mill. The viscosity of aqueous sols of the above flour decreases apparently as the result of enzyme action in solution, but the enzyme can be inactivated and the viscosity markedly stabilized by beforehand steaming the endosperm particles or flour at ambient pressure for 30-60 minutes and permitting the steamed material to air-dry. This novel product has utility as a general purpose thickening and suspending agent. It would be of use in drilling muds, and is superior to guar as a sizing agent for paper and related products.

PROCESS FOR PRODUCTION OF AMYLOSE FILM.

Frank C. Wohlrabe, Arthur M. Mark, William B. Roth, and Charles L. Mehlretter.

U. S. Patent 3,116,351. December 31, 1963.

A process for the rapid coagulation of an aqueous alkaline solution of amylose so as to provide self-supporting films that are hardened sufficiently to permit a take-up speed of at least about 400 feet/minute comprising the steps of forming an aqueous solution comprising 16-30% by weight of amylose and about 2.5% to about 6% by weight of sodium hydroxide (which latter component may be partly replaced by up to about 6% by weight of ammonium hydroxide), extruding the amylose-containing aqueous solution into the liquid phase of a slush-containing coagulation bath maintained at not above -16°C. and preferably at -19.5°C., said liquid phase comprising not less than 37.8% by weight of ammonium sulfate, about 3.2% by weight of sodium sulfate, and enough continuously added sulfuric acid to maintain a faintly acidic to neutral pH, and withdrawing the thusly coagulated amylose film from the coagulation bath at a speed of about 400 feet/minute.

Similar lists of publication abstracts and patents are available from the other three Regional Utilization Research and Development Divisions of the Agricultural Research Service, U. S. Department of Agriculture. The addresses and fields of research covered are:

<u>Division</u>	<u>Principal Fields of Research</u>
Eastern Utilization Research and Development Division 600 East Mermaid Lane Philadelphia, Pennsylvania 19118	Animal products: dairy, meat, fats, and leather; plant products: Eastern fruits and vegetables, tobacco, honey, maple, and new crops; and allergen studies.
Southern Utilization Research and Development Division Post Office Box 19687 New Orleans, Louisiana 70119	Cotton and cottonseed; tung fruit; pine gum; Southern fruits and vegetables, including citric, sweetpotatoes, and cucumbers; sugarcane; rice; peanuts; and new crops.
Western Utilization Research and Development Division 800 Buchanan Street Albany, California 94710	Western fruits, nuts, vegetables, and rice; poultry products; forage crops; wheat and barley; wool and mohair; sugar beets; dry beans and peas; castor beans; and new crops.

